European Commission

Business Innovation Observatory

Customer Experience

Neuro-marketing innovations

Case study 33

Enterprise and Industry

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Table of Contents

1. Executive summary

Neuro-marketing draws on **neuro-scientific technologies** to understand the **subconscious reasoning and behaviour of customers**. It measures brain and body signals instead of, or along with, traditional self-reporting tools like surveys or interviews. Neuro-marketing applies the following techniques in particular:

- Electroencephalography (EEG), which records electrical activity in the brain by attaching electrodes to the scalp;
- Magnetic Resonance Imaging (fMRI), which detects changes in blood flow in the brain; or
- Eye-tracking, which measures eye positions and eye movement;
- Facial emotion coding and reaction time related methods.

Different emotions that occur in a customer's mind when confronted with marketing stimuli

Source: Open, You're Sold! [1]

Neuro-marketing provides new ways to enhance traditional marketing instruments by using new types of user-interfaces, applications and software. It contributes to a **deeper understanding of how customers feel** about products and services and a better insight into how to engage with customers on an emotional basis.

A number of drivers have facilitated the trend's growth. For instance, companies are attracted by neuro-marketing's potential **to displace traditional market research** that has long relied on costly, time-consuming techniques like interviews and focus groups. Other companies invest in neuro-marketing as it is expected to lead to the development of new brain-computer interfaces that allow the human brain to communicate directly with external devices.

On the other hand, the trend still faces a number of barriers. For instance, neuro-marketing still lacks supporting scientific proof and it faces **credibility issues** as some early neuro-marketing enterprises have made exaggerated, unverified and scientifically irresponsible claims. Additionally, most studies still rely on laboratory set-ups and expensive technologies which don't allow the necessary **scalability** for the techniques to be applied more widely. However, some advances may be on the horizon given developments in mobile phone technology.

In order to overcome obstacles, this case study makes a number of policy recommendations. For instance, policy makers could **develop strategic initiatives** similar to the Brain Activity Map (BAM) project that started in 2013 in the USA which plans to invest around EUR 7.5 billion over 15 years into human brain research. Moreover, the use of EU funds should be simplified as neuro-marketing enterprises often struggle to incorporate the research emphasis in EU funding into their business activity. Further, policy makers could engage in discussions on **introducing ethical codes** for neuro-marketing. Taken together, these may strengthen the sector's image and enhance access to finance.

2. Neuro-marketing innovations

Neuro-marketing is an innovative approach which draws on neuro-scientific technologies like eye-tracking or brain imaging techniques to understand the **subconscious reasoning and behaviour** of customers.

These innovative methods are leading to the creation of new types of user-interfaces, applications and software that enable companies to "read the customer's mind" and tailor marketing practices, products and services accordingly. For instance, progress in neuro-marketing is expected to lead to the development of new **brain-computer interfaces** that allow the human brain to directly communicate with external devices.

Neuro-marketing's novel approach to research has the potential to be a disruptive force as it has the **potential to displace traditional market research** that has long relied on costly, time-consuming techniques, like interviews and focus groups. These traditional techniques – used by advertisers for the past century to create, place and measure the effects of advertising in traditional advertising – are not well-suited to understanding emotions and the unconscious.

Technological developments in information technology, coupled with increased internet usage over the past two decades, have fundamentally transformed market research. This development has been accelerated within the last five years due to the rapid proliferation of social networks and enhanced data analytics techniques.

Companies require a **deeper understanding of how customers really feel** about their brands and products and want to gain a better insight into how to engage with customers on an emotional basis. Indeed, in today's fast moving global customer market companies demand **easier, less invasive, faster and more cost effective methods** to understand their customers' unconscious emotions and feelings.

To accommodate this demand neuro-marketing has seen two waves that have sought to analyse the human unconscious reasoning: the **first wave** focused on "direct studies" analysing brain activities, e.g. through the use of Electroencephalography (EEG) or the more modern functional Magnetic Resonance Imaging (fMRI); and the **second wave** concentrated on "indirect studies" analysing changes in a human's physiological state, e.g. facial expressions, eye-movement, skin conductance, rate of inhalation, and heart rate.

By analysing a high volume of data and employing complex algorithms, market researchers are beginning to uncover patterns and correlations that lie beyond a person's conscious decision making. As such, market researchers are trying to understand why customers make decisions and which part of the brain is telling them to do so. This enables researchers to **identify emotional bonds** between customers and products which, in turn, facilitates investigations into how to strengthen these bonds, whether by enriching interfaces or improving branding strategies.

Yet neuro-marketing is faced with a **number of teething problems**, including the costliness and complexity of its state-of-the-art techniques like EEG or fMRI. Such techniques require laboratory set-ups and so do not lend themselves to day-to-day market research processes. In response to this, a **third neuro-marketing wave** is under way as innovative enterprises are developing ways to use low cost devices or even mobile phones to carry out in-home neuro-marketing measurements.

Neuro-marketing - it's new, it's hot, it's scary.
*– **Neurensics***

Key global players have started to invest heavily in the trend. Google Glass or large corporates using neuro-marketing

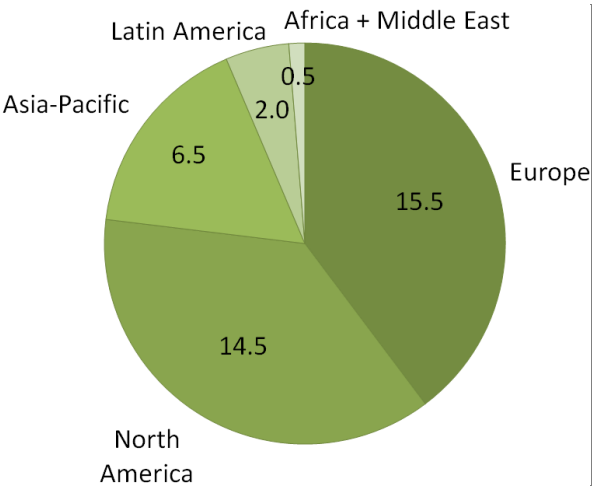
This case study focuses on European small and medium-sized enterprises (SMEs) and investigates which innovative approaches they are developing and how they are tackling the challenges they face during the early phases of their establishment.

3. Socio-Economic Relevance

3.1. The market potential of neuro-marketing

Global market research spending increased in 2013 to **EUR 29 billion**, representing a year-to-year increase of 0.7% after inflation.[2] Fast-growing emerging markets buoyed the global market research industry and countered losses and sluggish performances elsewhere in 2012 (Figure 1).

Figure 1: Global market research turnover by continent, in billion USD



Source: PwC Analysis; ESOMAR, Global Market Research 2013[3]

According to the European Society for Opinion and Market Research (ESOMAR), only **1% of the global market research expenditure is spent on neuro-marketing** (~EUR 300 million). According to the GreenBook Research Industry Trends Report the number of buyers who report using neuro-marketing has remained steady at around 10% in almost every poll since 2010. However, each year a higher percentage of respondents say they are considering using neuro-marketing at some point in the future (e.g. in 2013 in total 21%), but when the next survey comes in, actual usage has not really changed.[4]

Therefore, in spite of neuro-marketing being at a nascent stage, it is **expected to develop** as companies seek to enhance their competitive advantage. This development will likely be catalysed by increased neuro-marketing penetration rates that would build on the improved value proposition of neuro-marketing firms that had previously overpromised and under-delivered.

3.2. Benefits of neuro-marketing

A popular saying illustrating how difficult it is to qualify the response to advertising is attributed to the US American marketing pioneer John Wanamaker: "Half the money I spend on advertising is wasted; the trouble is I don't know which half."[5] As approximately 70% of all new products launched are taken off the market within two years, this assumption can hardly be rejected.[6] As a result, the **pressure to optimise advertising** effectiveness and accountability remains high. Neuro-marketing research provides new ways to contribute to these goals as it **enhances traditional marketing instruments** by drawing on innovative user-interfaces, applications and software.

*Neuro-marketing still is a young and controversial market. – **Neurensics***

In the long term, findings emanating from neuro-marketing might even change the **interaction between humans and machines** and lead to the development of new brain-computer interfaces that facilitate direct communication between the human brain and an external device.

3.3. The creation of new markets and jobs

Even though the full sequence of a human genome was completed and published in 2003, our **knowledge of the functioning of brain remains relatively limited**. Findings emanating from neuro-marketing activities thus have the potential to add significant academic value and may go far beyond the improvement of marketing techniques. In the long term findings from neuro-marketing research might for instance change how humans interact with machines. **New brain-computer interfaces** may facilitate the life of disabled persons relying on auxiliary equipment, e.g. by helping persons suffering from autism to better understand social interaction and non-verbal communication.

Neuro-marketing may be further included in **wearable smart electronics**, whose market – according to Gartner – will emerge as a EUR 7.5 billion industry by 2016. Thereby, such neuro-marketing applications and services may create value for consumers, especially when combined with personal preferences, while also providing more-detailed information to retailers for targeting advertisements and promotions.[7]

Furthermore, neuro-marketing is being applied to a **broad range of industries** that are applying its analytical techniques to a variety of business functions (Table 1).

Table 1: Sectors served by interviewed enterprises

Enterprise	Client sector
Neurensics	Mostly big corporates from the insurance and banking sectors. Also retail and consumer brands.
SMI	Market research, pretesting companies, scientific institutions (medical, marketing, psychology).
Neurosense	Mostly multinationals from retail, automobile, and media companies.
Synetiq	TV and film production; advertisement companies.
Emotion Explorer Lab	Mainly marketing sector (big brands and market research companies)
The Eye Tribe	Mainly marketing research companies and B2C.

Bearing in mind that neuro-marketing only captures about 1% of the global marketing research budget, while more than 10% of companies interviewed. In 2014 by the "GreenBook Research Industry Trends" consider using its techniques in the future, the creation of new markets and jobs are to be expected.[8]

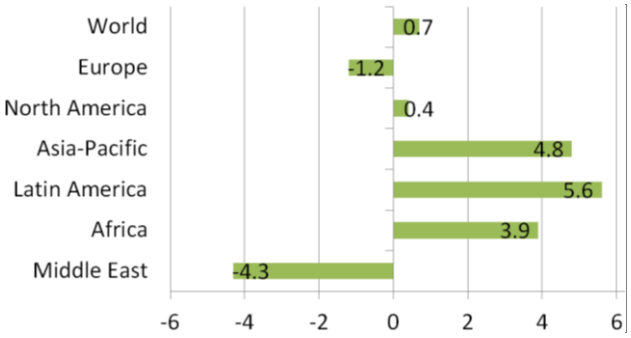
The case study enterprises have shown solid but no exponential growth in terms of employees since they were established (Table 2). This suggests that neuro-marketing is still at a nascent stage of development and is currently still awaiting its market uptake.

Table 2: Jobs created by interviewed enterprises

Enterprise	Jobs when founded	Jobs today
Neurensics	1 (2009)	11
SMI	2 (1991)	65
Neurosense	3 (1999)	15
Synetiq	2 (2014)	5
Emotion Explorer Lab	1 (2011)	6
The Eye Tribe	4 (2011)	16

All interviewed enterprises stated that they aim for global market reach. Apart from their **European home market**, companies naturally focus on the **US market**. Due to higher growth rates of market research spending in emerging markets some enterprises also actively target **Latin America** (e.g. Emotion Explorer Lab, Neurensics) and **Asia** (e.g. SMI) (Figure 2).

Figure 2: Global market research net growth rates 2012 (adjusted for inflation), in percent



Source: PwC Analysis; ESOMAR, Global Market Research 2013[9]

3.4. Scepticism towards neuro-marketing

As such, studies in the field of neuro-marketing are considered as relevant for better understanding human reasoning and for improving marketing techniques. Especially "indirect" studies using methods such as eye-tracking or facial recognition help to study human reactions when confronted with marketing stimuli. On the other hand, there is **certain scepticism** around "direct" neuro-marketing studies using fMRI or EEG recordings to study customers' unconscious emotions and level of engagement, e.g. towards products or brands.[10]

Yet as too many providers entered the neuro-marketing field in its early days and failed to apply sound and robust scientific methods, a lot of credibility was lost. Although the methods applied nowadays have a more profound scientific basis, neuro-marketing approaches **still lacks the scientific proof** that supports their case as meaningful methods and not just "hocus-pocus".

Nevertheless, interviewed enterprises believe that there is **no need to rush researchers in finding such proof**. To avoid over-promising on the power of neuro-marketing methods, it should be accepted that the case's development lies somewhere between the academic research stage, which may result in studies ending without proving any correlation, and the business stage, which seeks quick and profitable results.

After all, once the newly developed neuro-marketing methods have passed the scientific review cycle – being peer-reviewed and published in renowned journals – the approach could leverage on its full potential.

3.5. Client perspectives and challenges related to the uptake of the trend

The **technology adoption lifecycle** helps to explain why selling new technologies to "early adopters" is different from selling to "mainstream buyers." While early adopters are risk takers willing to buy new, unproven technologies in the hope that they might provide competitive advantage, mainstream buyers are risk-averse and require:

- Scalability;
- Trustworthiness;
- Connectivity to behaviour and real business outcomes; and
- Proof of contributing to consumer insights.[11]

Thus, as it stands, neuro-marketing is being used by early adopters but has **not managed to meet all requirements demanded by mainstream companies**. The most significant requirement neuro-marketing has not been able to meet is the requirement of scalability. For instance, neuro-marketing studies that rely on laboratory set-ups and expensive technologies (including fMRIs and EEGs) are too slow and unwieldy to meet the need of large samples. Therefore, only large companies like Coca Cola, P&G or Unilever with huge marketing budgets have been willing to seriously invest in this type of neuro-marketing so far.

The enterprises introduced by this case study have understood this challenge and have sought to tackle it by adopting a greater level of standardisation within their products, delivering quicker results to their clients and reducing costs.[12] To enhance scalability, Synetiq is using a device which only costs around EUR 500 [13], therefore allowing them to quickly build up their base of international test persons. The Eye Tribe's eye-tracking device is even less costly at around EUR 70 (USD 99) and Emotion Explorer Lab's software only needs a webcam to work. Ultimately, it can be expected that the **solution that is scalable, cost effective and delivers valid results within an acceptable margin of error** will have the best chances to succeed.[14]

After all, neuro-marketing is still an "experiment". There is growing consensus that previous intents were often failures but hope that the current approach will succeed. – ***SMI***

Furthermore, neuro-marketing still faces the **obstacle of trustworthiness**. Critics argue that too many neuro-marketing enterprises have made exaggerated, unverified, and scientifically irresponsible claims. Instead of educating the market about the long-established scientific foundations of their new field, most neuro-marketing enterprises still hide their methodologies in order to protect confidential intellectual property (IP).[15] Therefore, companies like The Eye Tribe and Synetiq put efforts in creating transparency by sharing their programme code and the outcomes of their studies.

Neuro-marketing researchers have also **failed to collect large samples of statistically-significant results** that back up their claims and prove their scientific validity. Although neuro-marketing helps us understand the difference between what people say and what they do, the field still needs to be applied on a broader level in order to be a true indicator of human behaviour. [16]

Hybrid models may increase neuro-marketing's effectiveness as combining EEG and eye-tracking with digital profiling techniques and predictive analytics (as done for instance by SMI) might improve results. Thus, experimentation along these lines might be key to the long term success of the innovative trend.[17]

3.6. Enterprises solving today's neuro-marketing challenges

The brain imaging technology fMRI only came onto the scene in the late 1990s, but has revolutionised research on the functioning of the brain ever since. And although fMRI and EEG dominate the public's perception of neuro-marketing, new technologies, tools and approaches have emerged, each with their own strengths and weaknesses.[18]

To illustrate the neuro-marketing trend in Europe, a set of six enterprises has been selected to be showcased in this case study. The selection of enterprises was not only made on base of success signals each venture could already provide, but also to cover all dimensions of the trend as well as different geographical European sub-regions where entrepreneurs installed their businesses. An overview of the enterprises and their business innovations is presented in Table 3 on page 7. Further details on each enterprise and their services are provided in the subsequent section.

Table 3: Overview of the enterprise cases referred to in this case study

Enterprise	HQ	Business innovation	Signals of success
Neurensics	NL	Scientific measurement of important brain functions and specific networks related to marketing stimuli that affect the buying process.	Voted as industry leader on neuro-marketing by Advertising Research Foundation (ARF).
SensoMotoric Instruments	DE	Synchronising and visualising of eye movement data with raw and interpreted EEG data streams within one common interface.	More than 60 employees and global reach.
Neurosense	UK	Scientifically developed and proven online response time tools that measure subconscious or implicit customer attitudes in less than a second.	Large corporates, e.g. BBC, Coca Cola, Ford Motors, Johnson & Johnson, L'Oreal, McDonalds, Procter & Gamble, Unilever.
Synetiq	HU	Crowd sourced neuro-marketing platform, where international community of test persons is equipped with portable EEG headsets to analyse their brain activity and reactions to marketing stimuli.	Participation at Startup Sauna accelerator programme (FI).
The Eye Tribe	DK	Low-cost eye-tracking device (USD 99) to register eye movement. Software can be used to analyse customers' behaviour.	EUR 1.3 million seed/angel funding and EUR 1.7 million grant from Danish National Advanced Technology Foundation. Voted most Innovative Company at SXSW Accelerator Competition.
Emotion Explorer Lab	ES	Standardised measurement of emotions captured by a webcam related to visual stimuli.	Finalist of Womenalia start-up competition. CEO speaker at Neuromarketing World Forum 2013 Sao Paulo and Brand Week Istanbul 2013.

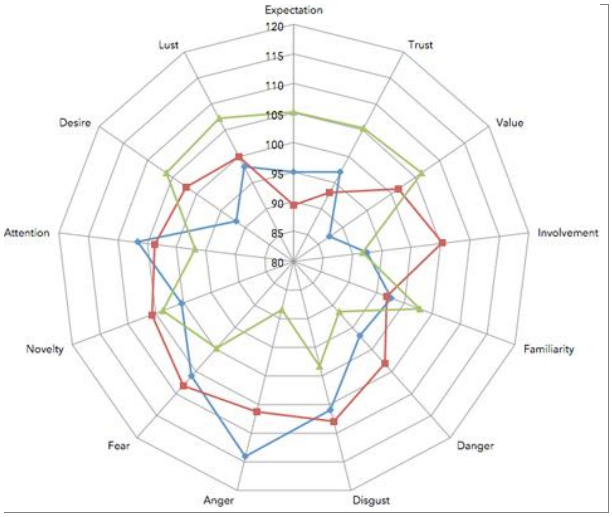
Problem 1 - Marketing experts do not know the actual effects that advertisements have on the brain. Therefore, they have only limited insight into how advertising works and how to optimise it.

Innovative solution 1 - In order to determine the unconscious motives of customers, Amsterdam-based (NL) **Neurensics** measures the brain activity of a representative segment of potential customers when viewing certain images, ranging from products, packaging, films, advertisements, logos to brands. During recent years, the Amsterdam-based enterprise Neurensics conducted the largest ever commercial brain research project on the effect of advertising.

Using MRI equipment, Neurensics has developed a method for identifying and measuring the activation of most of the important brain functions that affect the buying process. They developed benchmarks to predict the effectiveness of given marketing stimuli with scientific significance. This provides companies with unique insight into what customers are actually experiencing, allowing them to better predict intentions and behaviour.

For instance, Neurensics examined for a book publisher which brain networks need to be activated to compel consumers to buy a book. Subjects were shown books in three genres – good reads, thrillers and literature – while lying in an MRI scanner. The networks most relevant for triggering buying behaviour differed for each of the genres studied. The study also examined five elements of a book cover that can influence sales, such as photos versus illustrations or active versus passive titles. The findings provide meaningful insight into how and why consumers buy books and led to measurable higher sales by the publisher.

Measured associations related to certain stimuli



Source: Neurensics

Problem 2 - 95% of brain processing occurs below the conscious awareness level. These processes are hard to capture for marketing analysts.

Innovative solution 2 - Teltow-based (DE) **SensoMotoric Instruments** combines quantitative eye tracking and EEG metrics with a subjective rating of customers, in order to get an integrated picture of customers' responses.

Eye movements recorded with SMI Eye Tracking Glasses and brain response recorded with a wireless EEG neuroheadset are captured and synchronized in a single software. An integrated user interface allows real-time visualisation of the data for an in-depth analysis of the data streams synchronised to a common timestamp.

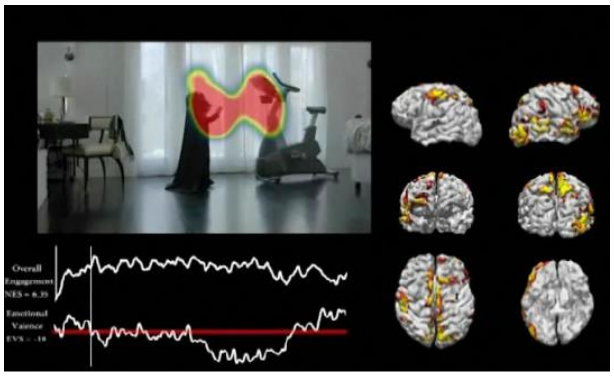
Recently, SMI announced their plan to develop and produce the first Tablet PC with market-ready eye tracking integration.

For instance, SMI's solutions can reveal consumers' general shopping behaviour in a supermarket. In a study they found out that respondents do hardly look at a product's ingredients but rather decide based on brand recognition and shopping habits. Customers devoted most attention to brands placed on the left side in the 4th and 5th shelf from the bottom. The results of the study allowed optimising the design and placement of products by changing their display to a higher level of the shelf. Further, the closer products were placed to the most popular and most purchased brand, the higher their sales became.

A test person using two of SMI's measurement devices

Source: SMI vision

Screenshot from SMI's software analysing a test person's reaction to a TV commercial



Source: SMI vision

Problem 3 – Companies demand easier, less invasive, faster and more cost effective methods to access their customer's sub-conscious emotions and feelings.

Innovative solution 3 - Offering implicit reaction time tests, Bristol-based (UK) **Neurosense** enables the measurement of customers' subconscious responses to brands, brand attributes, new products, advertisements, celebrity endorsers, packaging, websites and a host of other marketing stimuli.

The paradigms and tests developed by Neurosense are designed especially for commercial applications. Most of their online psychophysical tests have been validated alongside FMRI scans where the results of the two approaches have been shown to be highly correlated. Today, their tests overcome the problem of geographical scalability as they can be deployed quickly in any country and language.

A typical service of Neurosense is to improve the marketing strategy of their clients, by comparing their brands with those of their competitors.

Large corporates using Neurosense's applications

Source: Neurosense

Problem 4 – Most neuro-marketing tests can only be run on a restricted scale (in terms of the number of conducted tests as well as the geographical regions covered).

Innovative solution 4 - Budapest-based (HU) **Synetiq** is building an international tester community where companies can test how people react to their ads, movies, branding on a global pool of testers in a fast and efficient way. It sends portable EEG headsets to test persons all around the world in order to collect information on brain activity and reactions to presented marketing material. With its crowd-sourced software solution, Synetiq can track users' emotional response to any stimuli presented.

For instance, Synetiq's techniques can be used to pre-test nascent film and television projects, serving as a scalable diagnostic tool for a range of producers and studios to decide if new contents or formats may be financed and produced.

A testee taking part in Synetiq's research at home

Source: Syntetiq

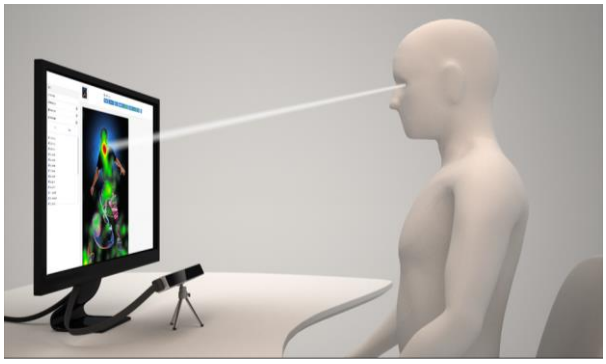
Problem 5 - High-end devices that are able to analyse eye-movements are costly and usually not portable.

Innovative solution 5 - Copenhagen-based (DK) **The Eye Tribe** developed a low-cost device and cloud-based software that allows the capturing of the customers' behaviour by analysing their eye-movements. Thanks to the low cost approach, The Eye Tribe facilitates the gathering of information on thousands, if not millions of different people. This bears a striking contrast to traditional eye-tracking studies that rely on a small set of tests.

Unlike other infrared eye tracking systems, that are expensive and proprietary, The Eye Tribe works with an open application programming interface (API) and low-cost hardware components that, in the future, could be integrated into the next generation of smartphones and tablets; thereby facilitating eye control of mobile devices and computers.

For instance, The Eye Tribe's techniques can be applied from concept testing to advertisement, providing robust results on advertisements' effect on customers during every step of the product's life cycle. It can be applied on packaging, prints ads, TV ads, product placement ad point of sale management.

The Eye Tribe's eye-tracker in action



Source: The Eye Tribe

The Eye Tribe's vision is that eye-tracking will be integrated within all of the devices of the future, such as computers, cars or even watches and lamps.

Challenge 6 - Facial emotions are obvious to see, but hard to measure in a standardised way.

Innovative solution 1 - Using webcams, Valencia-based (ES) **Emotion Explorer Lab**'s technology enables the analysis of facial emotions. Based on algorithm, their recognition technique can read emotions of a person being stimulated by different sensations, such as images, sounds or tastes.

The Emotion Explorer LAB also offers services in the area of neuro-marketing, neuro-politics, robotics and clinical research. In the area of retail for instance, they evaluate the attitude of the customer at the point of sale and offer relevant information about the target, such as age, sex, attention or mood.

For instance, The Emotion Explorer LAB's applications allow the analysis of customers watching a TV or hearing a radio advertisement in order to measure the emotions of the test person towards audio-visual stimuli.

A screenshot from the Emotion Explorer Lab's software

Source: Emotion Explorer Lab

4. Drivers and obstacles

The uptake of neuro-marketing in Europe is fostered by several drivers but also faces a number of barriers. These drivers and obstacles generate significant consequences on both enterprises developing solutions and companies interested in integrating them into their business operations.

4.1. Market entry barriers

One weakness of neuro-marketing has been its **lack of credibility** and the controversy that has often surrounded its activities. For instance, some neuro-marketing researchers promise to "read the customer's" mind, while critics argue that most neuro-marketing claims are premature, unverified or just plain wrong. Between these two perspectives is the consensus that the trend is still in its infancy and lacks the credibility to truly take off as an innovative trend.

To address the trend's trustworthiness problems, interviewed neuro-marketing enterprises currently try to make neuro-marketing more transparent. Synetiq, for instance, aims to publish all data it gathers, while only keeping its software code confidential.

Instead of disqualifying low-cost approaches such as webcam-based eye-tracking and facial expression analysis as unscientific, laboratory-based neuro-marketing enterprises try more and more to find new ways of how their more advanced scientific know-how and methodologies could complement "lightweight" methods better. **Hybrid solutions** that leverage and integrate the best of both approaches can combine the academic cutting-edge research with large sample sizes, rapid turnaround times and extremely low costs of the second and third wave methods of neuro-marketing.[19]

Interviewed enterprises considered as another market entry barrier the unfavourable entrepreneurial culture in Europe. During the interviews that were carried out for this case study, the entrepreneurial culture in Europe was discussed from different perspectives. Generally, the interviewed entrepreneurs agreed that most **European entrepreneurs lag behind their North or South American counterparts** in terms of dynamism, entrepreneurial spirit and openness for new ideas.

Moreover, according to Emotion Explorer Lab, many public policies are created in Europe on a **mistaken image of entrepreneurs**. While some public funding or business competitions target young start-up entrepreneurs around the age of 20, the average age of Emotion Explorer Lab's employees is 38 years. Emotion Explorer Lab's founder Maria Pocovi mentioned business competitions that excluded her enterprise as they were only open for entrepreneurs up to an age of 30 years. Indeed, the CEO and founders of two-thirds of the interviewed enterprises were older than 30 years, and considered their long academic education and careers as well as their life experience as key to their commercial success in the field of neuro-marketing.

While young entrepreneurs are usually very risk-affine and willing to challenge theirs status quo, "older" entrepreneurs' freedom is often much more limited due to different kinds of responsibilities they have, such as family or financial investments.

4.2. Access to funding

Access to finance is one of the most critical challenges for start-ups in Europe. The majority of enterprises interviewed for this case study illustrated their difficulties in attaining funding at the beginning or their business activities.

While **banks were considered as being "too conservative"** to lend to IT start-ups, EU funds – most of all Horizon 2020 as the biggest EU Research and Innovation programme – were a very relevant source of funding. Still, most enterprises interviewed were rather sceptical when it came to concrete terms.

*"We continuously need more funding until our cash-flow is positive" – **The Eye Tribe***

Neurensics, for instance, hesitated in applying for EU funding as they were not planning to publish the results of their work to a level of detail which would be required by EU programmes. Others complained of the **lack of transparency** of EU programmes, which makes it challenging to find out which EU programmes are available and how enterprises could qualify for funding. Furthermore, they believe that SMEs, when compared to larger companies, usually lack the time and money for the long and costly processes which are required by the application procedure for EU funding.

The Eye Tribe agreed upon this criticism, and mentioned that their application for **Horizon 2020** were always submitted with the help of universities or specialised consultants, as they themselves lacked the time to do all paper work themselves (Table 4 on page 11).

Table 4: Source of funding for interviewed enterprises

Enterprise	Source of funding
Neurensics	Self-funded but currently looking for external capital from investors for further growth.
SMI	Self-funded. Venture capital only used for spin-offs from SMI.
Neurosense	Self-funded. Currently looking for external funding through Boutique Venture capital and Private Equity organisations as well as potential trade partners.
Synetiq	Investment raised from Startup Sauna accelerator and a European VC.
Emotion Explorer Lab	Self-funded but currently looking for external capital from investors for further growth.
The Eye Tribe	EUR 1.3 million from SEED investors from Europe and US. EUR 1.5 million from Danish National Advanced Technology Foundation.

As regards **private funds**, the interviewed enterprises confirmed the well-known belief that **US investors have a greater risk** appetite than their European counterparts. In addition, early rounds of fundraising in the US typically generate greater absolute investments.

While Synetiq considered the overall situation for attracting funds to tech companies in Europe positively, it misses clear "large scale strategy" impulses from the policy maker.

Overall, the interviewees considered the US market not only more attractive for funding reasons but also believed it to be larger and more innovation-friendly. Still, enterprises found it difficult to attract US funding or even enter the US market while maintaining their headquarters in Europe.

Synetiq is also facing this issue on an intra-European level, as their clients are based all over Europe but their product and services' technological development occurs in Hungary (their home country), and the company's headquarters are located in Finland (as their Finnish venture capital partner insisted on such a structure). And in spite of it being easy to set up new headquarters in Finland, such construct constitutes a considerable administrative burden for them as various accounting, legal and tax issues needs to be settled in different countries.

4.3. Internationalisation

Thanks to the high interest neuro-marketing is experiencing these days, and combined with a long standing high reputation and rigorous scientific standards, companies like Neurosense, Neurensics and SMI do not face bigger problems in finding international contacts and business opportunities.

In particular those neuro-marketing enterprises whose business model relies on the use of high-tech machines are, however, facing other issues when internationalising. Neurensics, for instance, finds it difficult to rent MRIs in South America or in other emerging countries, which is why they consider a "machine exit" from expensive machines to scalable portable or online solutions as a key factor to grow globally.

Moreover, the Eye Tribe highlighted **legal and tax challenges** which come along with the inter-nationalisation of their business. With different standards and regulation not only on a global level, but in each EU member state, small enterprises often lack the resources and capacities to internationally expand.

*We could set-up our headquarter in Finland - all remotely from Hungary – **Synetiq***

5. Policy recommendations

5.1. Improve business environment to facilitate market access

The European policy maker could consider **developing strategic initiatives** in the field of neuro-science that would improve the business environment for the neuro-marketing approach as it enhances the scientific base on which the active enterprises work.

In the 1990s, the US government started the so-called "Human Genome Project". Of the EUR 2.8 billion that were invested within 13 years, it was later estimated that every dollar put into the human genome technology brought back one hundred dollars to the economy. Similarly, a US research initiative from 2013, entitled the Brain Activity Map (BAM) project, plans to invest around EUR 7.5 billion over 15 years into human brain research, aiming to develop a better understanding of the brain – naturally a prerequisite for all neuro-marketing activities working with brain-imaging techniques.[20]

Neurensics therefore suggested discussing similar initiatives on a European level, as better knowledge on the brain could help to increase the credibility of neuro-marketing and give European enterprises that would be involved in such study a competitive advantage. Such initiatives could further encourage involved neuro-marketing enterprises to publish more data on their research and methods and thereby tackle the issue of the lack of credibility.

Moreover, the policy maker could invest further efforts in **facilitating the set-up of new enterprises**. While Emotion Explorer Lab, a Spanish enterprise, noted the long and burdensome bureaucratic processes in Southern Europe, Syntetiq praised the possibility of setting-up a new company in Finland without even travelling physically to the country.

Generally, interviewed enterprises emphasised that the very first step of establishing new enterprises is usually much harder than undertaking the growth phase that follows. As a good example of how to facilitate this first phase through public policies, Neurensics mentioned that the Dutch government supports young enterprises by **reducing their tax burden** during the early phase of their business activities.In addition, the EU could promote policies initiatives as seen in the UK, where private investors are incentivised to invest in start-ups by receiving tax reductions.

Further, the policy maker should **de-risk entrepreneurship** by better differentiating his image of entrepreneurs, e.g. by less focusing on "young male persons in their early twenties" and better including female and/or entrepreneurs that are older than 30 years.

To encourage female entrepreneurs to start their business in a rather male dominated, technical area such as neuro-marketing, the policy maker could promote success stories of female founders, as seen in this case study with Neurosense's founder and managing director Professor Gemma Calvert or Emotion Explorer Lab's founder and CEO Maria Pocovi.

5.2. Improve SMEs' access to finance

To support enterprises to make better use of EU funds, the policy maker should **improve his communication on all information regarding EU funds** available, e.g. on their goals, their eligibility criteria or reporting standards. One enterprise interviewed suggested that the European Commission should improve its website to allow interested enterprises to find the right answers to questions more quickly.

Generally, enterprises interviewed agreed that the **access to EU funds**, in particular to Horizon 2020, should be facilitated by four measures:

- The time between the submission and validation of applications should be shortened;
- Shorter projects should be accepted. Start-ups typically cannot provide a 3-4 years plan, which is often required by EU grants, as it has to be able to quickly adopt to new business needs and changes;
- The overall application process for EU funds should be simplified so that interested enterprises no longer need the external help of universities or specialised consultants;
- EU funds should better take the realities of business into account, as most programmes seem to be customised for the research industry and, as a result, enterprises often struggle to properly integrate the EU funding processes into their business activity and are forced to follow their own business agenda anyway.

On the other hand, one enterprise interviewed stated that the public sector should limit itself to establishing and **aligning the framework conditions all over Europe** and not "flood the market with public money", as this could distort the dynamics of the market. As on the basis of their experience, as soon as start-ups accept public funding, their business approach risks deviating from its original direction as start-ups are committed to fulfilling the requirements of the public funding received.

Moreover, in order that enterprises are not compelled to have their headquarters in the same location as their investors, policy makers should **improve international investment law** by creating more standardised rules that would allow enterprises to build mixed international models, e.g. in order to be partially owned by EU and US funds. In doing so, the EU would be better acknowledging the international flexibility required for globally competitive companies. After all, the EU environment should be more attractive to foreign investments and not as exclusive, as it is today.

5.3. Harmonise international framework

Interviewed enterprises believe that EU policy makers should encourage Member State governments to better harmonise their business environment for start-ups, particularly with regards to **legal and tax requisites**. Apart from technical standards and norms in the field of neuro-marketing, the legal and tax framework could be aligned in order to facilitate enterprises' growth at least at the European level.

Last but not least, interviewed enterprises also suggested **establishing ethical codes**. Neurosense's CEO Gemma Calvert and Neurensic's CCO Martin de Munnik are two of the five board members of the global trade association "Neuromarketing Science & Business Association" (NMSBA). This association elaborated a "Code of Ethics for the Application of Neuroscience in Business", which demands for instance that personal information may not be kept longer than required for the purpose of the neuro-marketing research project or that participants less than 18 years of age shall only participate in studies with the informed consent of their parents. The policy maker could engage in discussion on such code and might even consider introducing certain aspects of the code into European or national law.

6. Appendices

6.1. Interviews

Enterprise	Interviewee	Position
Neurensics	Martin de Munnik	Co-Founder, CCO
SensoMotoric Instruments (SMI)	Eberhard Schmidt	Partner
Neurosense	Andy Dean	CEO
Synetiq	David Ottlik	Founder
The Eye Tribe	Sune Alstrup Johansen	CEO
Emotion Explorer Lab	Maria Pocovi	Founder, CEO

6.2. Websites

Neurensics	www.neurensics.com
SensoMotoric Instruments (SMI)	www.smivision.com
Neurosense	www.neurosense.com
Synetiq	www.synetiq.net
The Eye Tribe	www.theeyetribe.com
Emotion Explorer Lab	www.emotionexplorerlab.net

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